

## CLAIMS

1. Apparatus including a phase-lock loop, the phase-lock loop  
5 comprising an oscillator (20) for generating a variable frequency signal and  
having a control input (22) for controlling the frequency of the variable  
frequency signal, dividing means (30) coupled to an output of the oscillator  
(20) for dividing the variable frequency signal, phase comparator means (40)  
coupled to an output of the dividing means (30) for generating a comparison  
10 signal indicative of a phase difference between the divided variable frequency  
signal and a reference signal, filtering means (50) coupled to an output of the  
phase comparator (40) means for filtering the comparison signal, coupling  
means (25) for coupling an output of the filtering means (50) to the control  
input (22) of the oscillator (20), further comprising modulation means (210 or  
15 400, 410) for causing the comparison signal to be modulated at a plurality of  
rates, measurement means (220) for measuring for each of the plurality of  
rates an indication of the peak-to-peak variation of a control signal applied to  
the control input (22) of the oscillator (20), and adjustment means (230)  
operable to adjust a loop gain in response to the measurements to obtain a  
20 predetermined loop frequency response.

2. Apparatus as claimed in claim 1, wherein the dividing means (30)  
has a variable division ratio and the modulation means (210 or 400, 410) for  
causing the comparison signal to be modulated at a plurality of rates  
25 comprises means (210 or 410) for modulating the variable division ratio at a  
plurality of rates.

3. Apparatus as claimed in claim 1, wherein the modulation means  
(210) for causing the comparison signal to be modulated at a plurality of rates  
30 comprises means (210) for modulating the frequency of the reference signal.

4. Apparatus as claimed in claim 1, wherein the modulation means (410, 400) for causing the comparison signal to be modulated at a plurality of rates comprises means (410, 400) for modulating the filtered comparison signal.

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5. Apparatus as claimed in any one of claims 1 to 4, wherein the phase comparator (40) comprises means (40) for generating pulses of current and the adjustment means (230) comprises means (230) for adjusting the amplitude or duration of the pulses of current.

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6. Apparatus as claimed in any one of claims 1 to 4, wherein the PLL further comprises a variable gain stage (20) and the adjustment means is operable to adjust the loop gain by varying the gain of the variable gain stage (20).

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7. A method of calibrating a phase-lock loop including a variable frequency oscillator (20) having a control input (22) for controlling the frequency of the oscillator, a divider (30) for dividing a signal generated by the variable frequency oscillator, a phase comparator (40) for generating a comparison signal indicative of the phase difference between the divided signal and a reference signal, filtering means (50) for filtering the comparison signal, and coupling means (25) for coupling an output of the filtering means (50) to the control input (22) of the variable frequency oscillator (20), the method comprising modulating the comparison signal at a plurality of rates, measuring for each of the plurality of rates an indication of the peak-to-peak variation of a control signal applied to the control input of the variable frequency oscillator, and, in response to the measurements, adjusting a loop gain to obtain a predetermined loop frequency response.

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8. A method as claimed in claim 7, wherein the divider (30) has a variable division ratio and modulating the comparison signal comprises modulating the variable division ratio.

9. A method as claimed in claim 7, wherein modulating the comparison signal comprises modulating the frequency of the reference signal.

5 10. A method as claimed in claim 7, wherein modulating the comparison signal comprises modulating the filtered comparison signal.

11. A method as claimed in any one of claims 7 to 10, wherein the phase comparator (40) comprises means for generating pulses of current and  
10 adjusting the loop gain comprises varying the amplitude or duration of the pulses.

12. A method as claimed in any one of claims 7 to 10, wherein the PLL further comprises a variable gain stage (20) and adjusting the loop gain  
15 comprises varying the gain of the variable gain stage.